THE

AMERICAN JOURNAL

OF THE MEDICAL SCIENCES.

FEBRUARY, 1903.

DISEASES OF THE PANCREAS.[1]

By John B. Deaver, M.D.,
SURGEON-IN-CHIEF TO GERMAN HOSPITAL, PHILADELPHIA.

The pancreas is situated in the epigastric and left hypochondriac regions, on the body of the first lumbar vertebra, and from its protected position is less liable to injury and also less accessible to surgical manipulation than the other abdominal organs. Ashhurst quotes a table of 868 cases of injury to the solid viscera of the abdomen, of which only 1.5 per cent. were injuries to the pancreas. It is an elongated organ, measuring from 12 to 20 cm. in length, 4 to 5 cm. in width, and weighs from 60 to 100 grammes. It is pinkish in color and soft in texture, and may conveniently be divided into the head, neck, body, and tail.

Glinski has pointed out anomalies of the pancreas due to disturbances during development, and notes several forms of accessory and divided pancreas. An annular deformity, with resulting constricture of the duodenum, has been observed by Tieken.

The pancreas is a racemose gland made up of numerous lobes and lobules held together by a connective tissue framework and closely resembling the parotid gland in its structure. The secreting glands and acini are composed of high columnar cells becoming lower in the smallest ducts and again columnar in the larger ducts, which unite and empty into the pancreatic duct of Wirsung.

Langerhans, in 1869, after a careful study of the pancreas of rabbits, which closely resembles that of other mammals, described groups of cells, irregularly polygonal and having a round nucleus situated in the parenchyma of the lobules; these are termed the "islands of Langerhans." They are of the same origin as the glandular acini, but are independent of them, and have an intimate relation with the vascular system, the capillaries forming a network with a tortuous course and resembling the glomeruli of the kidney. The "islands" are three and a half times more numerous in the tail of the organ than in other portions, and probably have some special function, imperfectly understood as yet, but probably having some relation to carbohydrate metabolism. Lewaschew claimed that he could increase their number by overstimulation of the gland with repeated injections of pilocarpine and by overfeeding, and that this increase took place at the expense of the acini; but Opie by a series of careful experiments on dogs found that prolonged stimulation does not transform groups of acini into "islands of Langerhans."

---

[1] Read before the West Penn Medical Society, Pittsburg, November 25, 1902.

The relation of lesions of the pancreas to diabetes is of great interest, and Opie and others have found marked changes in the "islands of Langerhans" in this connection without any alteration in the parenchyma of the gland.

The pancreatic or Wirsung's duct commences near the tail of the pancreas and passes from left to right, becoming larger as it receives the tributaries, and at the neck of the gland turns slightly downward and backward, and unites, near the head of the pancreas, with the common bile-duct, and they together form the ampulla of Vater, which empties by a narrow opening into the posterior surface of the duodenum, about three inches from the stomach. In nearly every instance a second or accessory duct is present—Santorini's duct. This leaves the main duct before its union with the bile-duct, passes behind the latter, and is continued forward into the duodenum, about two inches from the stomach and about one inch above the opening of the diverticulum of Vater. Schirmer in a study of 105 anatomical specimens found that in all but 2 instances some evidence of a second duct was present, and that in 53 per cent. of the cases this accessory duct was capable of draining the pancreas, and at the same time was not subject to stoppage by gallstones. Bünger found an accessory duct in only 10 per cent. of 58 cadavers examined.

The diverticulum of Vater is about 8 mm. in length, conical in shape, with the apex opening into the duodenum on a longitudinal fold of mucous membrane, and the two ducts opening into the base rather nearer the posterior than the anterior wall. Bünger, however, states that in 98 to 99 per cent. of his 58 examinations the two ducts did not unite, but opened at separate points in the duodenum, and that, as a rule, the pancreatic passed beneath the bile-duct.

These anatomical peculiarities are interesting because of the etiology of pancreatitis. Opie makes the following statement in reviewing a case of Halsted's: "A small gallstone impacted in the diverticulum of Vater may occlude the common orifice of the bile-duct and duct of Wirsung and convert them into a continuous closed channel. Bile enters the pancreas by way of the pancreatic duct, and the pancreas becomes the seat of inflammatory changes characterized by necrosis of the parenchymatous cells, hemorrhage, and the accumulation of inflammatory products. Anatomical peculiarities of the diverticulum of Vater do not permit this sequence of events in all individuals."

The pancreas holds a relation to many important structures, and the severity of the symptoms when it is attacked by disease is undoubtedly due to this relation. The head is in intimate relation to the curving duodenum and to the superior mesenteric vessels, and is crossed by the transverse colon. Sometimes a prolongation reaches the lesser curve of the stomach. The body is in contact with the stomach anteriorly, and with the diaphragmatic crura, vena cava, aorta, superior mesenteric vessels, left kidney, and suprarenal gland posteriorly. It is also in relation with the cœliac axis, solar plexus, and splenic artery. The tail is in contact with the anterior surface of the spleen.

The blood supply of the pancreas is derived from the splenic, hepatic, and superior mesenteric arteries, and is returned into the portal system.

The lymphatics terminate in glands lying on the splenic and superior mesenteric arteries and between the pancreas and spleen and pancreas and duodenum.

Branches from the solar plexus furnish the nerve supply.

The peritoneum is derived from a reflection of the transverse mesocolon.

The secretion from the pancreas is clear, alkaline in reaction, with a specific gravity of about 1030, and contains four ferments, trypsin, amylopsin, steapsin, and a milk-curdling ferment. Steapsin is the fat-splitting ferment and is frequently a factor in the production of fat necrosis. Baker, in 1882, was the first to describe this condition, which has since been investigated by Langerhans, Hildebrand, Flexner, Opie, Korte, and others, and has furnished a fertile field for experimental study. By fat necrosis is meant the action of the pancreatic secretion upon surrounding fat areas and the splitting of this fat into fat acids and glycerin, and the combination of the fatty acids with lime salts with the resulting formation of whitish patches in the omentum, mesentery, and subperitoneal fat, and occasionally in the pericardial or subcutaneous fat as well.

In experimental work fat necrosis has been produced by ligating the pancreatic duct in animals and stimulation of the pancreas by pilocarpine. The animals lived for twenty or thirty days after the operation, thus allowing the pancreatic secretion to penetrate for some distance, and both Opie and Flexner have obtained fat necrosis of the epicardial fat in this way. Associated with the fat necrosis, hemorrhage of the pancreas has usually been observed, and the action of the glycerin set free has been ascribed as the cause, but proof as yet is wanting.

The pancreas is rarely injured, owing to its protected situation, but this occurs occasionally as the result of blows upon the abdomen or from behind, and gunshot or stab wounds. The late President McKinley was wounded in the pancreas indirectly, and the organ became necrotic in part, though no fat necrosis occurred.

The injury will be followed by rapid onset of shock and early collapse, and, if the pancreas alone is injured, little bleeding follows. The combination of the digesting action of the pancreatic ferments with a bacterial infection from the wound itself necessitates immediate operation and the repair of the injured organ; but in most cases other viscera, like the spleen or liver, are involved, and severe hemorrhage makes the prognosis far from hopeful. Injury of the pancreas which is not so severe as to cause rupture may induce the formation of inflammatory cysts, especially into the lesser peritoneal sac, with the foramen of Winslow closed by inflammatory process. These tumors form with great rapidity. Chronic pancreatitis may follow bruising or result from injury to the pancreas during operations upon the stomach or biliary passages, when, from the difficulty of the operation, the pancreas has been excessively handled; therefore, these operations should be done with the greatest care and gentleness. Prolapse of the pancreas through an abdominal wound is rare, but has been recorded several times. Robson has collected eight such cases from the literature.

In February, 1889, Reginald Fitz, of Boston, delivered the Middleton-Goldsmith Lecture for that year upon the subject of "Acute Pancreatitis." The service he rendered to the medical profession may be judged from the fact that every subsequent writer upon this subject has acknowledged his indebtedness to Fitz for the impetus which that celebrated internist gave to the pathology and treatment of the disease.

Until 1842 the subject of pancreatitis was mostly discussed from a theoretical standpoint, and such views as prevailed associated the diseased pancreas with mercurial poisoning.

Classen, in 1842, collected six cases which he regarded as probable pancreatic disease that had resulted fatally, and described the symptoms of the disease from these cases. As Fitz points out, the correctness of the diagnosis of these cases is very doubtful.

Klebs, Friedrich, and Balser published valuable contributions to the subject, and Balser, in 1882, called attention to the presence of areas of fat necrosis associated with pancreatic disease. Senn, in 1886, published his classical work on the surgery of the pancreas, and in 1889

Fitz accurately described and classified acute pancreatitis, advising palliative treatment in the early stages, and suggesting surgical treatment in the suppurative and gangrenous forms.

In 1895 Birch-Hirschfeld described chronic pancreatitis, and Schlessinger, in 1898, investigated this condition further. In 1900 Mayo Robson, in a lecture before the London Polyclinic, pointed out the surgical importance of chronic pancreatitis, and called attention to the similarity which it bore to cancer of the pancreas.

The etiology of pancreatitis is still obscure. It seems to be a disease of the middle period of life of high-livers, and more especially when a free use of alcohol is indulged in, and in those who have a tendency toward corpulency. Gastroduodenal catarrh, with extension to the duct, and followed by bacterial invasion, may be a factor, and as the duodenum from its contour will aid in the delay of any decomposing food products, this factor should be seriously considered.

Ulcer and cancer of the stomach, pylorus or duodenum and zymotic disease, such as enteric fever, mumps, and influenza, are the determining factors stated by Mayo Robson.

Biliary and pancreatic calculi are certain causes of pancreatitis. The association of gallstones with pancreatic disease has been repeatedly observed and recorded, and the impaction of a stone in the ampulla of Vater at its orifice will cause the penetration of bile into the pancreatic ducts and an acute pancreatitis. This has been observed clinically and produced experimentally.

Pancreatitis may be divided clinically into acute, subacute, and chronic.

Acute pancreatitis is characterized by the sudden onset of pain in the epigastrium, colicky in nature, accompanied by prostration and anxiety. Vomiting is an early symptom, and, as a rule, is severe. Examination of the abdomen reveals a tender swelling in the epigastrium, tympanitic upon percussion. Constipation develops, and is so difficult to overcome that acute intestinal obstruction has frequently been made as the diagnosis. Collapse may rapidly follow, with a distending and rigid abdomen, small, rapid pulse, irregular temperature, delirium, and death. In these cases the pancreas is found to be the seat of an acute cellular or fibrinocellular infiltration of the connective tissue of the organ, with a more or less extensive necrosis of the lobules, and with diffused hemorrhage into the organ; fat necrosis, if present, is not widely distributed; a blood count is useful in determining the amount of hæmoglobin. In the less acute cases life may be prolonged for days, and recovery sometimes occurs.

The diagnosis of acute pancreatitis is attended with difficulty, owing to the obscurity of the symptoms, which are mainly those of acute peritonitis originating in the epigastrium. Intestinal obstruction is the usual diagnosis made, and in fact the two may coexist, as Robson points out, from strangulation of the duodenum by inflammatory material or by the swollen pancreas itself. The obstruction, however, is not so absolute, and repeated enemas, before peritonitis has supervened, finally restore the peristalsis of the bowel. In favor of intestinal obstruction is the slow pulse, normal or subnormal temperature, the more general and usually greater degree of abdominal distention, inability to stool or pass flatus, vomiting persistent, soon becoming stercoraceous. Palpation of abdominal walls excites storms of pain. In favor of pancreatic disease is the history of previous attacks. In perforating gastric or duodenal ulcer the tenderness to pressure is not so acute, and there is less muscular rigidity in the early stages. The early bowel paresis will raise the lower border of liver dulness in ulcer, and there are also the premonitory symptoms of gastric pain associated with taking food, the occasional vomiting of blood if the stomach or the first portion of the duodenum be the seat of the ulcer, black stools, if the ulcer be in the lower portion of the duodenum, and the chlorotic tendency.

In cholecystitis the pain is never as severe, and is located over the gall-bladder, radiating to the right shoulder, breast or back, while in pancreatitis, if radiation occurs, it tends to go toward the left. There is usually a history of enteric fever and gallstone attacks. Rigidity is less general and early distention seldom present.

Acute ptomaïne poisoning may resemble pancreatitis, but the more general nature of the colic, the constant diarrhœa, and the previous history should decide the diagnosis.

The treatment of pancreatitis is still open to discussion. Many of the milder cases recover without operation, but, on the other hand, the majority of the severe acute cases rapidly collapse, and may die without a diagnosis having been made. Definite rules for treatment cannot be laid down, but to each case the judgment of the surgeon must be applied.

In the less severe type of cases the patient should be put at absolute rest, giving sufficient morphine to quiet the pain, which is always very severe, combating depression by the use of stimulants, especially enteroclysis, combining whiskey with the salt solution. The vomiting may be relieved by lavage and rectal feeding, and for the feeling of oppression in the epigastrium hot fomentations or turpentine stupes may be applied.

In cases which are more severe the abdomen may be opened and gauze drainage introduced. The hemorrhagic form of pancreatitis may be accompanied by necrosis and disintegration of gland tissue, and such conditions are best treated by a free incision and gauze drainage. In this form of pancreatitis the anæmic condition of the patient, as in extra-uterine hemorrhage, may be marked.

In the very severe cases the extreme shock will contraindicate operation and require every possible stimulation to save the life of the patient. Death is often a matter of hours from the onset of the initial acute symptoms.

The following cases occurred during the past two years at the German Hospital:

Mrs. C. S., aged twenty-seven years. Family history of tuberculosis. Previous history negative, except for habitual constipation and the free use of alcohol of recent years. Three weeks before admission the patient was exposed to cold and wet, and became acutely jaundiced, with pain across the back, and nausea and vomiting. It lasted a few days and she then improved. This was probably an attack of alcoholic gastroduodenitis. The jaundice subsided. Eight days before admission she was suddenly seized with pain throughout the abdomen, most marked on the right side, high up. No vomiting, but bowels were constipated. The pain continued until her admission to the German Hospital.

On admission the patient was anæmic-looking, with yellow scleræ. Temperature of 101°; pulse, 120. The abdomen was slightly distended and tender all over, with a point of greatest intensity one inch above and one inch to the right of the umbilicus. Gall-bladder tender, but not enlarged. Spleen was slightly enlarged. No mass could be detected. The X-ray showed the absence of a pathological shadow. The urine contained a trace of albumin, but no sugar or casts. There were 24,400 leucocytes to the cubic millimetre. Vaginal examination negative. On the day after admission she vomited large quantities of a greenish material, and the leucocytes rose to 32,800. Vomiting continued for twenty-four hours, and was then relieved by gastric lavage.

Six days after admission she was much better, the abdomen was flat, and no pain or tenderness except an occasional colic about the umbilicus. Leucocytes were still high, 21,600; twelve days after admission she was up and about the room, with a normal temperature and blood count, and no pain of any kind.

Mrs. M. C., aged fifty years. No family or previous personal history was obtained. Patient was admitted to the hospital in a state of collapse, with subnormal temperature, rapid and feeble pulse, cold, clammy skin, and cyanosis.

The abdomen was distended, rigid, and tender throughout, with very intense colicky pain in the epigastrium. Death took place six hours after admission. From her relatives it was elicited that twenty-four hours previous to admission she had been suddenly seized with violent epigastric pain, nausea, vomiting, and diarrhœa. There was no alcoholic history. The woman was quite stout. Post-mortem revealed a diffused fat necrosis of the omentum and mesentery, which in some places had broken down and undergone calcareous degeneration. The pancreas was enlarged and hard, with a hemorrhagic appearance on section. No gallstones were present.

As has been stated, hemorrhage into the pancreas may cause foci of necrosis, and when this process gradually increases, with larger areas of coagulation, necrosis and sequestration of portions of the gland, the condition of necrosing pancreatitis exists.

Gangrenous and suppurating pancreatitis are due to the invasion of the gland with micro-organisms, and are accompanied, as a rule, by widely disseminated fat necrosis. The gangrenous form is probably a later result of hemorrhagic pancreatitis, and the pancreas may be dry, black, and necrotic.

Suppurative pancreatitis may coexist with the necrotizing form, and is characterized by purulent collections in the parenchyma or interstitial tissue of the gland, with sometimes a general infiltration. Such abscesses may form peripancreatic collections and rupture into the stomach, duodenum, or colon. Thrombus of the portal vein and infection of the liver may follow the extension of infection.

The symptoms of the suppurating and gangrenous forms of pancreatitis are marked by the usual sudden onset, with intense pain, vomiting, and shock, followed by septic symptoms, with, perhaps, delirium. Palpation elicits the most valuable symptom—a tender mass in the epigastrium. The continuance of the symptoms observed in many of these cases allows time for a thorough examination of the stools for fat or evidence of imperfect digestion. The urine may show evidence of glycosuria and, therefore, disease of the islands of Langerhans. The presence of the fat-splitting ferment of the pancreatic juice has not been clearly demonstrated in the urine, and the success of such a test would be a valuable sign in the diagnosis of the disease. Reduction in the amount of ethereal sulphates in the urine is an inconsistent sign of pancreatic disease, but has not been sufficiently tried as yet.

The treatment of the suppurative and gangrenous form of pancreatitis consists in laparotomy, evacuation of pus and drainage of the purulent foci. The following case occurred a few days ago in the German Hospital:

Mr. T., aged fifty-two years. Family history negative. Had ordinary diseases of childhood. Malaria, typhoid fever twenty-six years ago, and rheumatism. Uses alcohol and tobacco moderately. Bowels irregular, and digestion fair, some tendency toward dyspepsia. Twenty-five years ago he had an attack of colicky pain in epigastrium, with vomiting; no jaundice. Lasted twenty-four hours, and the pain during that time was very severe. Has had four attacks similar to this. Three days before admission he had a slight colic in epigastrium, vomiting, dyspeptic symptoms, like belching and nausea, and noticed that his abdomen was distended and the stools clay-colored. On the day before admission had a sharper attack of vomiting of a clear, green, bile-stained material.

On admission the patient is a heavy, stout man, with yellow scleræ, coated tongue, muddy skin, and a distended and tympanitic abdomen. This distention is most marked in the epigastric region, at which locality considerable tenderness could be elicited on palpation. He complained of pain across the lower thorax, which was accentuated by coughing, during which time acute pain was felt over the abdomen. The urine showed the presence of albumin, casts, and bile, but no sugar. The blood indicated an anæmia and 8200 leucocytes. The stools contained free fat. An X-ray gave a shadow dense in character and over the region of the pancreas.

The patient was kept at rest for a week after admission without any change in his symptoms being observed. The temperature remained between 100° and 101° F., the pulse about 90, and respiration at 28.

On the day before operation there were 13,850 leucocytes counted with 81.3 per cent. of the polynuclear type and 18.7 per cent. of the mononuclear type. There were no eosinophiles observed. Vomiting ceased under treatment, but the strength of the patient was rapidly failing, and operation was decided upon. No mass could be felt at any time in the region of the pancreas, but there was a sense of resistance over the gall-bladder and pancreatic regions, with marked tenderness.

Operation under ether anæsthesia, which was administered with difficulty owing to the cyanotic condition of the patient. An incision was made through the left rectus. The omentum was observed to be speckled with areas of fat necrosis, and the epigastrium was the seat of a peritonitis. The gastrocolic omentum was opened with the fingers and the lesser peritoneum found to be full of a chocolate-like material. This was mopped out with sponges and rubber, and gauze drainage passed down to the bottom of the cavity. The patient's condition forbade any further interference, and he was sent back to bed. Death occurred three hours later.

As no autopsy was permitted the operative wound was merely opened and slightly enlarged. Diffused fat necrosis was found in the omentum, mesentery, and peritoneal fat. The meso-appendix and the epiploic appendages were involved. There were many areas of calcareous infiltration, some of which had broken down. On widely opening the gastrocolic and gastrohepatic omenta and raising the stomach the pancreas was found to be necrotic, black, and gangrenous throughout its entirety, with the exception of the head, which, while apparently diseased, was not gangrenous. The entire fat of the lesser peritoneum and adjacent structures, including the peritoneal fat, was in a state of necrosis and mostly liquefaction necrosis. The spleen was slightly enlarged. The gall-bladder was distended and filled with gallstones, many of which were small, and the cystic duct was occluded by a stone. The liver appeared normal. The common duct was free from a stone as far as could be determined, though its course in the pancreas could not be found. The ampulla of Vater was clear. The pancreatic duct could not be made out. No further post-mortem examination could be made. Cultures were taken from the region of disease, and are being studied.

Subacute pancreatitis will present the general symptoms of the more severe type, but in a lessened degree. The onset is more gradual, the pain is less severe, and the vomiting is not so violent. The case is more prolonged and the primary constipation is frequently succeeded by diarrhœa, with pus or blood in the stools. The temperature is more elevated, as a rule, and the depression is markedly lower. The patient in the fatal cases gradually loses strength and weight, or may show evidences of severe septic poisoning. If an abscess develops, a tender tumor mass may be palpated in the epigastrium.

The treatment of subacute pancreatitis has been described, and will vary with the severity of the symptoms and the presence or absence of suppuration.

Chronic indurative pancreatitis is probably a more common disease than the number of reported cases seems to show, and many of those cases diagnosed as malignant disease of the head of the pancreas are probably of this character.

Opie's conclusions, after a study of twenty-nine cases of chronic pancreatitis, define the present status of the etiology and pathology of the disease:

"1. Chronic interstitial pancreatitis is slightly more frequent in males than in females. Two-thirds of the total number of cases occur between the ages of forty and sixty years. 2. The most frequent cause of chronic pancreatitis is obstruction of the duct of Wirsung, due to pancreatic calculi, to biliary calculi in the terminal part of the common bile-duct, or to carcinoma invading the head or body of the gland. Duct obstruction may be followed by the invasion of bacteria, which take part in the production of the resulting lesion. 3. Ascending infection of the unobstructed duct of Wirsung may follow an acute lesion of the duodenum or of the bile passages, and may cause chronic inflammation. In cases which have given a history of long, persistent vomiting, chronic diffuse pancreatitis may be found at autopsy, and is probably the result of an ascending infection of the gland. 4. General or local tuberculosis is occasionally accompanied by chronic diffuse pancreatitis, affecting chiefly the interstitial tissue of the gland. 5. Chronic interstitial pancreatitis is not infrequently dependent upon the same etiological factors, notably alcohol, which produce cirrhosis of the liver, and in about one-fourth of the cases the two lesions are associated. 6. Following duct obstruction and ascending infection, the lesion affects principally the interlobular tissue, only secondarily invading the lobular tissue and sparing the islands of Langerhans. Diabetes results only when the lesion is far advanced. 7. Accompanying the so-called atrophic or Laennec's cirrhosis of the liver the pancreas is sometimes the seat of diffuse chronic inflammation, characterized by diffuse proliferation of the interacinar tissue, which invades the islands of Langerhans. A similar lesion accompanied hyaline degeneration of the islands of Langerhans and the condition known as hæmochromatosis. 8. Interacinar pancreatitis is usually accompanied by diabetes mellitus. When diabetes is absent the lesion is of such slight intensity that the islands of Langerhans are little implicated."

The diagnosis of this condition is rather difficult to make because of the usual gradual and painless onset. In some cases the initial symptoms resemble those of a gallstone attack, with pain, vomiting, and jaundice. The pain is more in the epigastrium, however, and may be referred to the left side or backward to the midscapular region. The greatest point of tenderness will be found one inch above and one inch to the right of the umbilicus. When the induration of the head of the pancreas is sufficient to obstruct the bile-duct jaundice slowly deepens and becomes chronic. There is usually rigidity of the recti muscles. Asthenia is a constant symptom, and dyspeptic symptoms and frequently diarrhœa will be noted. In the later stages the cachexia, the tumor which may be palpated in the epigastrium, and the enlarged gall-bladder present a picture which is very difficult to diagnose from that of malignant disease.

In all of Mayo Robson's cases numerous adhesions were found around the duodenum, pylorus, and hepatic flexure of the colon, and even occluding the foramen of Winslow and adherent to the gall-bladder and liver.

Later sequelæ may result, such as gastro-ectasis, abscess of the liver, ascites, and intestinal obstruction from the constricting adhesions.

The differential diagnosis must be made from gallstones, malignant disease of the pancreas, liver, and biliary passages, and chronic gastritis.

The diagnosis of gallstones is not very important, as both diseases require a surgical operation.

The previous history of repeated attacks of colic, intermittent jaundice, the absence of enlargement of the gall-bladder, and the location of the tenderness to palpation, with the direction of the referred pain, will often indicate the diagnosis.

From carcinoma of the pancreas the diagnosis, as has been said, is difficult and seldom made. The more marked cachexia, the absence of pain or tenderness, enlargement of the gall-bladder, normal temperature, extreme jaundice, ascites, and the enlarged, smooth liver are the usual symptoms observed in malignant disease. When the liver is involved nodular masses may be palpated.

Chronic gastritis, especially when it is associated with catarrh of the duodenum or biliary passages, has been mistaken for chronic pancreatitis; but active medical treatment should soon relieve the symptoms which resemble those of the pancreatic lesion.

The treatment of chronic pancreatitis consists in the relief of tension by opening and draining the gall-bladder, with the formation of a biliary fistula. Cholecystostomy is the operation to be preferred to the former method of cholecystenterostomy.

The following cases of chronic pancreatitis occurred at the German Hospital recently.

E. O., aged forty-four years. Family history is negative. During early life he had measles, whooping-cough, scarlet fever, varicella, mumps, and diphtheria; but since twelve years of age has enjoyed almost perfect health until 1890, when he had an attack of diarrhœa lasting for nearly four years, more or less severe in character. Appetite is always good, and no dyspeptic symptoms have been experienced. He smokes five or six cigars daily, uses alcohol moderately, and is a man of very good habits.

In 1891 he had a sudden and severe attack of pain in the epigastrium, lasting two or three hours, then passing downward throughout the abdomen, and followed by diarrhœa; no vomiting. The pain was colicky in nature, and usually relieved by sinapisms. A number of attacks recurred at intervals of six months. In July, 1901, he had an attack similar to the preceding, but more severe in character; it lasted about two hours, and was relieved by the application of a strong red-pepper plaster; no vomiting. After this attack he enjoyed exceptionally good health until June, 1902. Owing to overwork, he became depressed and nervous. His physician found that his heart action was weak and irregular, and prescribed rest. Œdema of the feet was present, and a urine examination excluded nephritis. He then became progressively weaker, with anorexia, and again suffered from diarrhœa and pain in the region of the epigastrium, colicky in nature, but nearly constant. There was a sensation of bloating present. During the week previous to admission there was constant epigastric pain, with marked constipation and with rectal tenesmus and desire to have a bowel movement, without result. No nausea or vomiting; no urinary symptoms.

On admission the patient is flabby and rather stout, with a pale skin of a dull, ashen color. Scleræ are yellow, tongue is coated, and breath is foul. Pulse is rapid, and the patient is markedly nervous. Heart is weak, with a tendency to irregularity. The lungs are clear, and no apparent enlargement can be made of the liver, gall-bladder, or spleen. There is no albumin, sugar, or biliary coloring-matter in the urine. The epigastrium is tender and the abdomen distended. No palpable tumor could be detected over the pancreas, but chronic pancreatitis was diagnosed.

Operation under ether anæsthesia revealed a hardened and enlarged pancreas at its head, without any fat necrosis. The bowels were carefully gone over from the sigmoid to the pylorus, and no obstruction bands found, nor was there any peritonitis beyond the early stages of hyperæmia. The gall-bladder was distended and somewhat enlarged, while the liver was light in color and probably fatty.

A cholecystostomy was performed, with the difference that the gall-bladder was sutured to the peritoneum and aponeurosis without opening it, and gauze drains were introduced not only around the gall-bladder, but to the space below the liver.

The patient reacted very well from the operation, and two days later the gall-bladder was opened with the actual cautery, and rubber drainage instituted. Seven days after operation part of the drainage was removed, and thirteen days after operation the remaining gauze was taken out. The patient then became rapidly convalescent.

S. Z., aged fifty-five years. One brother died of tuberculous enteritis. Measles, whooping-cough, influenza, and malaria. Bowels are irregular and appetite good. Moderate user of alcohol. The attack of malaria occurred twenty years ago, and was accompanied by jaundice, lasting for three or four weeks, and colicky pain in the epigastrium, followed by irregularity of bowels and dyspeptic symptoms for some years. Six weeks before admission he was seized with severe pain in the epigastrium, colicky in nature, and referred to the umbilicus; one week later became jaundiced, with intense itching. Urine was dark, and stools became lighter. No vomiting.

On admission patient was markedly jaundiced, with a slow pulse. He was a large man, with considerable adipose tissue. Examination of abdomen: The liver is enlarged, but not tender. The gall-bladder is large, palpable, and very tender, and an X-ray revealed a dense shadow in the epigastrium, to the right of the median line. The urine contained albumin, casts, and biliary coloring-matters, but no sugar. The blood showed a marked anæmia, 5000 leucocytes, and delayed coagulation. There were no gallstones in the stools.

Operation was performed, under ether anæsthesia, eight days after admission. The gall-bladder was much distended and fluctuating and non-adherent; it was aspirated of 350 c.c. of thick bile and the opening closed with a hæmostat. No gallstones were detected in the gall-bladder, cystic or common ducts. The pancreas was found to be enlarged, hard, and infiltrated. A cholecystoduodenostomy was performed, using a small Murphy button. The wound was closed with silk tier sutures, and except for a small stitch abscess the patient made an uninterrupted recovery, and was discharged twenty-eight days after operation. His jaundice had nearly faded, and the stools were of a natural color.

J. C. K., aged fifty-eight years; a shoemaker by occupation. Family and previous personal history was negative. Used alcohol moderately. His position while at work caused occasional pains in the epigastrium, but never vomiting. He had never, to his knowledge, passed blood or gallstones in the stools. Six months before admission he suffered from weakness, anorexia, and coldness of the extremities, and was placed on a milk diet, which caused marked constipation. Three weeks later he became jaundiced, which deepened, but without pain other than an occasional colicky attack to the right of the epigastrium. He lost weight—twenty-three pounds—during the six months.

On admission the heart and lungs were normal, the spleen not enlarged. Temperature and pulse normal. He was profoundly jaundiced and emaciated. The urine contained a trace of albumin; no casts or sugar; a normal amount of urea; absence of indican and presence of bile. A stomach analysis showed a trace of hydrochloric acid, the presence of lactic acid, and a total acidity of 12. Boas-Appler bacilli were absent. The stools were negative for free fat or gallstones. A number of blood examinations revealed an anæmia, no leucocytosis, and delayed coagulation. The latter was not benefited by the use of calcium chloride for the four days preceding operation. An examination of the abdomen found the recti muscles rigid, especially in their upper quadrants. To percussion an area of dulness could be detected over the region of the pancreas and extending above and to the right and merging with the liver dulness. The inguinal lymphatics were enlarged. A fluoroscopic examination revealed a diffuse shadow around the head of the pancreas.

Operation was performed four days after admission, under ether anæsthesia. The gall-bladder was found to be small and adherent to the liver, with a large stone in the cystic duct. A cholecystectomy was done and a peritoneal cuff sewed over the stump. Following the common duct with the finger in the foramen of Winslow a round, hard mass could be made out, presumably a stone in the common duct near the duodenum. The abdomen was deep and examination difficult, but the common duct was dilated to three times its normal size. The duodenum was opened opposite the ampulla, and the obstruction was found to be the head of the pancreas; the duodenum was therefore closed and opened behind, and a choledochoduodenostomy performed, with silk suture. An incision was then made in the right loin and gauze disposed about the anastomosis, leading across the stump of the gall-bladder and thence under the liver and out the loin. A rubber tube and two wicks of gauze were used to drain from the anastomosis through the abdominal wound. Abdomen partly closed. The patient left the table in fairly good condition, with pulse of 72. There was a continuous capillary oozing, however, and the patient grew weaker, the pulse feebler, and death took place twenty-four hours after operation.

A post-mortem revealed a chronic pancreatitis, mitral insufficiency, nutmeg liver, and chronic congestion of the spleen and kidneys. There was no fat necrosis.

Pancreatic lithiasis is a condition difficult to diagnose. Chronic interstitial pancreatitis is usually associated, and dilatation of the duct and cyst or abscess formation may result. The symptoms resemble those of biliary colic, with radiation of the pain to the left side; rarely jaundice. Glycosæmia may be present, and the calculi have been recovered from the stools. If the condition be diagnosed the stone might be removed by opening the duct through the duodenum in the same manner that a biliary calculus in the common duct close to the duodenum is extracted.

Cysts of the pancreas have been observed and operated upon a number of times by surgeons. In Körte's recent monograph 121 cases are collected, of which 60 were in males and 56 in females. According to the origin he divides them into:

1. Traumatic, following blows or continued pressure upon the abdomen.
2. Post-inflammatory.
3. Cysts without any apparent exciting cause. In this class of cases the cysts existed for a very long time and caused but few symptoms. A cyst of this character occurred at the German Hospital during the present year, and will be discussed shortly.

Anatomically, Robson gives this classification:

1. Retention cysts.
2. Proliferation cysts; cystic adenoma or epithelioma.
3. Hydatid cysts.
4. Congenital cystic disease.

5. Hemorrhagic cysts.
6. Pseudocysts.

Retention cysts are due, as a rule, to plugging of the main duct or of the smaller ducts, with consequent dilatation of them and of the alveoli. They have been recognized during the course of operation by several observers.

Proliferation cysts are usually true glandular cystomata.

Hydatid and congenital cysts are very rare conditions.

Of hemorrhagic cysts Mayo Robson writes that "it may be stated with emphasis that there is no valid or acceptable evidence in favor of the hemorrhagic origin of these cysts; the tendency to bleeding, in greater or less degree, is observed in all pancreatic cysts, and the presence, therefore, of blood in predominant quantity is not sufficient to establish a hemorrhagic onset."

Pseudocysts are usually traumatic in origin or follow inflammatory affections of the pancreas, and are really accumulations of fluid in the lesser peritoneal cavity. Jordan Lloyd concludes that "when the contents of such tumors are found to have the property of rapidly converting starch into sugar we may assume that the pancreas has been injured."

The situation of pancreatic cysts is variable. Any part of the gland may give rise to them, but the tail is the most frequent site. The direction of the growth is also variable; the greater number, developing in the lesser peritoneal sac, push the stomach upward and to the right, and emerge between the stomach and transverse colon. In some cases the tumor reaches the abdominal wall above both the stomach and colon, pushing them downward; in other instances the cyst is below the colon and at the lower portion of the lesser sac, between the two layers of the transverse mesocolon. Occasionally the cyst extends in the direction of the spleen or the kidney. As a rule, the cyst is adherent to the surrounding structures, especially to the stomach, colon, duodenum, omentum, and anterior abdominal wall. Some cases are free from adhesions, and excision is easy.

As to the contents, Robson, quoting from Körte, concludes that the characteristics of a pancreatic cyst are "a blood-stained, reddish-brown or dark fluid, slightly viscid, alkaline, rich in albumin, of a specific gravity of 1010 to 1020. Ferments are frequently present, and when in pronounced quantity establish the diagnosis; their absence allows no conclusions to be drawn against the pancreatic origin of the cyst." The writer has observed the contents to be oily, and again to appear like sebaceous material.

The symptoms of a pancreatic cyst depend upon the pressure exerted. In neither of the cases herein reported was pain a symptom of any moment. Both patients complained of epigastric discomfort at times, but no distinct pain. Vomiting is usually present, is more marked after eating, and is in direct proportion to the amount of pain suffered. Our two cases were free from pain, and never complained of vomiting. Constipation is the rule, and jaundice may be present and is dependent upon the obstruction to the common bile-duct. Wasting frequently results, with advancing weakness. The presence of sugar in the urine, fat and undigested proteids in the stools, and decolorization of the stools has been observed, but is not constant.

The differential diagnosis must be made from renal tumors, such as hydronephrosis, enlarged spleen, ovarian cysts, hydatid cysts of the liver, mesenteric cysts, retroperitoneal sarcoma, and large abdominal aneurisms. The previous history and slow onset, with progressive weakness; the deep situation of the tumor and its immobility; the condition of the stools; and, further, the fact that the great majority of cystic tumors in the epigastrium are pancreatic, should aid in the diagnosis. The treatment of cysts of the pancreas consists in abdominal section and removal when possible; or in case of extensive adhesions, or their having a broad basal attachment, incision, and drainage.

The following cases occurred at the German Hospital during the past three years:

Mrs. E. S., aged fifty-eight years. One brother died of tuberculosis. Previous history negative. Menopause at forty years of age. Her habits were good. Three years ago she had a "typhoid malarial" infection, as she termed it, which lasted for a number of months. The symptoms of this attack were but imperfectly described, but it evidently was a long and mild attack of enteric fever. A few years after the menopause she became stouter and corpulent, and has continued to slowly increase in the girth of the abdomen. Constipation was the rule, and occasionally she would have difficulty in micturition. She was sent to the hospital and the case diagnosed as ovarian cyst.

On admission the patient is a large and stout woman, with a circumference at the umbilicus of fifty-two inches. She suffers no pain. Examination of the abdomen revealed enlarged and tortuous superficial veins, general fluctuation, and deep-seated tympany in the right flank, and dulness, but not flatness, in the left flank. The anterior surface of the abdomen was flat to percussion, extending upward to the ensiform, and the area of dulness was not altered by any change in position. No outlines of a cyst or mass could be definitely made out, though there was a hard, cartilage-like body two inches below and two inches to the right of the ensiform, about 4 x 3 cm. in size and just beneath the abdominal wall. The lower border of liver dulness is displaced upward for two inches. The apex-beat is pushed slightly upward and to the left. Vaginal examination negative. The urine was free from albumin and sugar, and a blood count showed marked anæmia, with a normal leucocyte count.

Under ether an incision three inches in length was made in the median line above the pubis. On opening the peritoneum about

3000 c.c. of ascitic fluid were evacuated. It was then possible to determine that a large cyst was present in the upper abdomen, adherent to the anterior abdominal wall, colon, omentum, and other viscera, and by an adhesive band to the right broad ligament. The incision was continued upward to the ensiform, and the adhesions found so extensive that removal of the cyst was totally impossible. The lower three-fourths of the wound were sutured, leaving glass and gauze drainage in the pelvis. The cyst was aspirated of 500 c.c. of an oily, yellow fluid and its edges sutured to the aponeurosis and peritoneum, and the cavity of the cyst drained with gauze and a rubber tube.

The patient made an uninterrupted recovery, but the fistula from the cyst was not closed. An examination of the fluid aspirated found it to be oily, thick, and yellowish in appearance. On standing it separated into two layers—the upper yellow and curdy, the lower greenish-brown and thinner.

Microscopically, cholesterin crystals and a few epithelial and blood cells and an unrecognizable, colloid-like material. Specific gravity, 1023. Much albumin, but no sugar. Neutral or slightly acid in reaction. No methæmoglobin. Cultures on bouillon and agar showed negative results. Digests albumin without the presence of an acid.

Mrs. McC., aged fifty-eight years. Family and previous history negative. Has had nine children and five miscarriages. Menopause when fifty years of age. Thirty years ago, without any known cause or trauma, she noticed on awakening that she had a mass over the stomach and just below the left costal margin. This was not accompanied by pain or vomiting. It was about the size of a large orange. No jaundice at any time; no diarrhœa. The tumor has slowly increased in size, and is more apparent at present from loss of weight in the past two months. She has never had any discomfort from this tumor-mass, and suffers no dyspeptic symptoms.

On admission the patient is a stout woman, without any subjective symptoms. The lungs are clear and the spleen and liver dulness normal. Her abdomen is flaccid, and reveals the presence of a tumor extending from the umbilicus to the diaphragm, moving with respiration, slightly fluctuating, and can be slightly moved by the examining hand. It occupies the whole epigastric space, and is evidently a cyst in the lesser peritoneum (?). Urine is negative. Blood count shows absence of anæmia, but a marked eosinophilia of the leucocytes. Gastric analysis reveals a trace of lactic acid, a total acidity of 20 per cent., and the absence of free hydrochloric acid. Microscopically the Boas-Offler bacillus was present.

Operation was urgently advised, but was refused. She is still in good health at the present time, five months after discharge from the hospital.

Of the new-growths occurring in the pancreas, carcinoma is the most frequent. Sarcoma, adenoma, and lymphoma are rare, while in general miliary tuberculosis the pancreas is frequently involved. Syphilis, both congenital and acquired, interstitial and gummatous, has been seen, but it is rare.

The head of the organ is most commonly involved in carcinoma, and the disease may be primary, or, what is more frequent, secondary to malignant disease of the surrounding structures, especially the stomach. Males are affected most frequently; from forty to sixty years is the usual age, and the most common variety is the scirrhous form.

The early symptoms are very vague and often lacking entirely. A gradual weakening of the muscles and a steady loss of weight, together with anorexia, a feeling of fulness after eating, and other symptoms of dyspepsia, will be noticed. This is succeeded very often by lancinating pains, becoming continuous, attacks of vomiting, and an ever-increasing jaundice, with enlargement of the gall-bladder. Glycosuria, fatty stools, or other evidence of retained pancreatic secretion may be present and aid in the diagnosis. Emaciation becomes extreme, and a tumor can be felt on palpation in the epigastrium, tender, hard, and scarcely movable. There is seldom any temperature, and ascites is frequently noticed. Death usually occurs within twelve months.

In instances where the common duct is not pressed upon, as in those cases where the malignant growth is confined to the body or tail, jaundice is absent and the symptoms atypical, and are like those of any other malignant growth.

Pressure on the portal vein and vena cava may cause thrombus and its usual sequelæ.

The differential diagnosis of this disease is exceedingly difficult in the early stages and rather easy in the late stages. The development of obstructive jaundice following dyspeptic attacks, with a distended gall-bladder and a rather increasing cachexia, are the most important signs, together with the effects upon the stools of the absence of the pancreatic secretion.

Two diseases—viz., common duct obstruction with a gallstone or chronic interstitial pancreatitis—must be diagnosed, because they are usually cured by a surgical operation, while malignant disease is nearly hopeless.

In the gallstone affection there is nearly always a history of previous colics, because the stone must have passed the cystic and traversed the common duct before impaction near the head of the pancreas. The gall-bladder is not distended, the rigidity of the right rectus is marked, the jaundice does not deepen until of a greenish hue, but alternately fades and disappears, often accompanied by intermittent pain, fever, and even rigors. There is less loss of weight, and the disease may drag on for years, though the longer the time that elapses between impaction of the stone and its removal the greater the risk of a carcinoma developing from the gallstone irritation.

In chronic pancreatitis the history of gallstone attacks and its association with dyspepsia must be elicited. The age of the simple affection is earlier, and there is more tenderness. The cachexia is very slight compared to that of carcinoma, and the jaundice is not so intense.

The treatment of malignant disease offers but little hope of cure. Robson records fourteen cases where the portion of the gland affected was removed, with ten deaths. The risk of injury to bloodvessels, together with shock, gangrene of the duodenum, and peritonitis, is great. The biliary stasis may be relieved by a cholecystostomy or a cholecystenterostomy.

The following case occurred last year at the German Hospital:

C. F. G., aged forty-three years. Family history negative. Has had dyspepsia and constipation for many years, and was in very poor health during early adult life. Six months before admission he suddenly became jaundiced, and without any pain. There was bile in the urine and clay-colored stools. Continued yellow, with a gradual loss of weight and strength, until three weeks ago, when he suffered from severe pain in the gall-bladder region and radiating to the right shoulder and back; had hæmaturia also. This pain has continued and increased in severity.

Examination on admission reveals marked jaundice, emaciation, and a mass between the umbilicus and the right costal arch. There is anæmia and 11,500 leucocytes. The patient insisting upon an exploratory operation, despite the diagnosis of malignancy, the abdomen was opened and a carcinoma at the head of the pancreas found. The gall-bladder, which was very much distended, was aspirated and closed with Lembert suture. The abdomen was closed with silk tier sutures.

The patient never stopped oozing after operation. Transfusion was performed, and the wound in the arm also continued to bleed. Death occurred in twenty-four hours. No autopsy was allowed.

The technique of operations upon the pancreas will vary with the needs of the individual case. The organ may be reached: (1) Through the gastrohepatic omentum, above the stomach; (2) through the gastrocolic omentum, below the stomach; (3) through the transverse mesocolon, back of the colon and stomach; (4) from the loin, behind the peritoneum.

Extensive lacerations or wounds of the pancreas should be treated as early as possible after the receipt of the injury, and the wound sought and closed with suture, avoiding puncture of the main duct. All hemorrhage, of course, is controlled; but in cases where the blood-supply is greatly destroyed necrosis is likely to result.

The pancreas is reached by widely opening the lesser peritoneum and turning the stomach up; the organ can then be seen and palpated, and, if necessary, the transverse mesocolon may also be incised to directly reach the gland. It is best to drain after operations upon the pancreas, and to favor the formation of a pancreatic fistula rather than allow the retention of the digesting secretion.

In acute pancreatitis surgical intervention had better be postponed until the primary acute symptoms, with the accompanying shock, have abated, or until the appearance of symptoms indicating suppuration.

The treatment has been outlined early in this paper. Should surgical intervention be demanded an incision may be made above the umbilicus and about four inches long. After opening the peritoneum the omentum may be examined for fat necrosis, and a vertical incision made in the gastrocolic omentum, opening the lesser sac. The pancreas can then be examined, and an incision in the transverse mesocolon will expose the gland and confirm the diagnosis. A second oblique incision is then made in the left loin at the costovertebral angle, and the lesser peritoneal sac cleansed of blood and packed with gauze. Partial suturing completes the operation. Prompt stimulation must be used to combat shock.

Chronic pancreatitis must be treated by abdominal section and cholecystostomy. The operation of cholecystenterostomy and choledochoduodenostomy are harder to perform and are not as effectual in securing free drainage.

Cholecystostomy. The gall-bladder is exposed by an incision through the right rectus muscle, and excepting in highly infectious cases is generally freed from adhesions, which when met with usually involve the abdominal wall, liver, omentum, duodenum, pylorus, and colon. The gall-bladder is isolated by gauze pads and aspirated of its contents. The puncture is then enlarged and the gall-bladder examined for stones; if present they may be removed with forceps or scoop. A small piece of iodoform gauze is introduced into the gall-bladder and the opening temporarily closed with hæmostatic forceps; the gall-bladder is then brought into the wound, if possible. A piece of gauze is passed around the gall-bladder in such a manner as to allow the lower end of the gauze to protrude from the lower end of the wound, and the gall-bladder is sutured to the aponeurotic layer of the abdominal wall. Before tying the gall-bladder sutures the gauze pads are removed, but not the gauze around the gall-bladder. The sutures are tied, the wound above and below the gall-bladder closed, the hæmostatic forceps removed, the piece of iodoform gauze taken out of the gall-bladder, and a solid rubber drainage-tube carried into the gall-bladder. This drains into a receptacle at the side of the patient.

The results of surgical treatment in this class of cases is very encouraging. Of twenty-four cases operated upon by Mayo Robson, in twenty-one a complete and perfect recovery ensued.

The operative procedure in pancreatic cysts will depend upon the degree of adhesion to surrounding structures; and as this almost invariably occurs, the extirpation of the cyst is difficult unless, as is the case in rare instances, the cyst is pedunculated. Aspiration of the cyst should only be performed when the patient is severely ill from diabetes or the effects of pressure. The cyst will always refill, and the danger of leakage into the peritoneum from the point of puncture is very great.

Whenever practicable the abdomen should be opened by a median incision above the umbilicus and by incising the gastrocolic omentum. This exposes the cyst. Its contents should be withdrawn by an aspirator, as the needle is removed closing the puncture with one or more hæmostats. The cyst wall is then drawn to the wound, and the subsequent procedures are exactly as in cholecystostomy, viz., suture of the cyst wall to the parietal peritoneum and draining the cyst. Where some of the contents of the cyst escape during aspiration it is safer to make a second incision in the loin and drain the lesser sac. Körte collected eighty-four cases operated upon by this method, with five deaths.

When the cyst is small, and from its position and relations cannot be brought to the abdominal wound, the rubber drainage-tube should be introduced into the cavity of the cyst, and by careful gauze packing so surrounded that leakage is prevented.

Malignant disease of the pancreas is better left alone, or a palliative measure performed, such as cholecystostomy or cholecystenterostomy.

X-RAY FINDINGS IN PATHOLOGICAL CONDITIONS OF THE PANCREAS.

BY M. I. WILBERT,
DIRECTOR OF X-RAY LABORATORY, GERMAN HOSPITAL.

It will generally be admitted that the X-rays may ultimately play a very important part as an aid in recognizing pathological conditions of the abdominal organs. Even at the present time much valuable collateral information may be obtained from this source, providing the picture as seen on the fluorescent screen or the photographic plate be properly interpreted.

While it is true that too much reliance should not be placed in the findings of the X-ray laboratory, especially in cases that involve the abdominal viscera, it is equally true that any possible errors are entirely due to the personal equation of the operator. It is probable, therefore, that as operators, with increased experience, improve their technique or have access to improved tubes and other pieces of apparatus, this source of error will be largely if not entirely eliminated.

The possible causes of errors of this kind become more evident when we remember that conditions of any kind manifest themselves, under the X-rays, as what are popularly termed shadows, and that these shadows, in turn, are caused by relatively dense masses of matter which intercept or absorb the rays of energy emanating from a vacuum tube. It will readily be appreciated, therefore, that in the abdominal cavity we may have causes for a variety of shadows of different densities, and that these shadows may or may not be due to pathological changes.

If we bear in mind, then, that X-ray findings, at the present time at least, can hardly be considered to furnish more than corroborative